The Bundesbank's Reaction To Policy Conflicts*

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Abstract
We investigate the Bundesbank's behavior in cases of policy conflict with the German government. We show that the central bank did systematically mitigate its policy stance whenever monetary and fiscal policy were inconsistent. The result is robust with regard to different variants of the conflict indicator. For instance, we get similar results if we focus on conflicts characterized by "too conservative" monetary policy and falling fiscal surpluses. The German central bank might have been the world's most conservative monetary authority, but it did not act in a political vacuum. This might have important implications for the ECB.

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1. Introduction

The German Bundesbank is well known for its successful monetary policy and its high degree of legal independence (Eijffinger and De Haan 1996). But does this mean the bank operated in a political vacuum? The answer most practitioners and students of the Bundesbank are likely to give is no. From the well known "Gürzenich affair" in the mid 1950s to the quarrels about bank's policy after the German re-unification or the recent "Goldwar", the Bundesbank has been engaged in policy conflicts (Goodman 1989, Marsh 1992, Berger and De Haan 1997). More often than not these conflicts involved the government and the accusation that the Bundesbank acted "too conservative". It might even be argued that it was exactly its skilled management of these conflicts that helped the German central bank to its reputation as being autonomous (Berger 1997a). The question is whether the Bundesbank did compromise when political pressure was applied.[1]

Given the benchmark character of the Bundesbank for the design of monetary institutions in general and the European Central Bank (ECB) in particular (Escriva and Fagan 1996), the answer to this question is of some importance. Take the example of the ECB. Its legal status is based on the unanimous consent of the members of the monetary union, which makes it very difficult to change its degree of independence (Giovannini 1995, Kenen 1995). Since in the case of the Bundesbank the government's legislative majority could have, in principle, robed the bank of its independence at any time, De Haan (1997) has argued the ECB is even more autonomous than the Bundesbank.[2] This conjecture implies that the current ECB structure might not be an equilibrium. Countries that only reluctantly complied with the idea that the new bank would have to have the *same* degree of independence as the Bundesbank to "rule Europe", will probably not accept an even *higher* degree of actual autonomy. If this view is correct, the early years of the new institution could be marked by political turmoil and conflicts as countries try to escape the rigidities of the current ECB contract. We can, for instance, imagine European Monetary Union (EMU) members asking for regional preferences in bank refinancing or for fiscal countermeasures to monetary policy. Such turbulence seems likely to erode the ECB’s legitimacy and is thus potentially costly. But did the Bundesbank really react to political pressure?

One way to come to grips with the Bundesbank–government relations, and, thus, with the potential differences in behavior of the future ECB, is to go beyond the existing qualitative case studies and their possible ambiguities. The principal idea suggested in the literature is to construct a measure of the government’s demand for a change in central bank policy. Havrilesky’s (1995) pressure index for the US Fed is based on an extensive examination of government opinion as reflected in newspaper reports. While this approach is potentially very interesting, the task of building such an index for Germany has yet to be tackled (Maier and De Haan 1998). The alternative, Frey and Schneider’s (1981) conflict indicator, instead turns to policy variables to define time spans of conflicting fiscal and monetary policy stances. In addition to being based on readily available quantitative variables, this approach also has the advantage of a better developed theoretical background. This is the avenue we will follow in the remainder of the paper.

Section 2 will discuss the Frey/Schneider model of central bank behavior in the presence of a potentially hostile and powerful government. Section 3 develops the conflict index which is then used in Section 4 to estimate the Bundesbank's policy reaction function in such a model. Sections 5 and 6 provide robustness checks by looking at an asymmetric conflict definition and by controlling for the institutional particularities of the Bretton Woods period. Section 7 takes a second look at the reaction function from a dynamic perspective. Section 8 concludes by summarizing our results and interpreting them in the light of the issues raised in the introduction.

2. The Public Choice Approach to Central Banking

According to Frey and Schneider (1981), a central bank (or an individual central bank board member) obtains private welfare from keeping inflation low for two reasons. A stable price level is the institution's principal official target variable and is very likely to be internalized as an ideology.[3] It also reflects the preferences of the financial community, the bank's main reference group.[4] A rigorous anti-inflation policy serves both ends. In carrying out such a policy, an independent central bank is said to be independent of the voters' wishes, even though public opinion might enter through the political pressure exerted by the government.

There are three potentially binding constraints for the central bank's policy. The first is a *political* constraint imposed by government. The model assumes that the central bank maximizes its private welfare within the bounds defined by the policy stance preferred by the government. In order to make the approach empirically feasible, Frey and Schneider (1981) take the actual fiscal policy as a proxy variable for the government's preferences. Consequently, whenever the policies of the central bank and those of the government are not compatible, the government will apply pressure to the central bank to force it to adopt the fiscal policy stance.[5] In addition, the monetary authority lacks the direct accountability of the government. Ultimately any democratically elected government whose views are in line with public opinion can discipline the central bank by reducing either its personnel or policy independence.[6]

There may also be a second important constraint imposed on the central bank's action, an *institutional* one. In a system of fixed exchange rates and full convertibility the central bank has little scope for following policy aims of its own. As a matter of fact, German monetary policy was probably subject to such a constraint during the Bretton Woods system after the D-Mark became convertible in the late 1950s.[7] The restriction was exogenous to the

Bundesbank, because matters of the exchange rate fall under the competence of the federal government (article 73 of the Constitution), with the bank's board having an advisory function only (article 13 of the Federal Banking Law). A third type of constraint is purely *economic*. The central bank will have to take into account the nature of the economy as this determines the effect that monetary policy instruments will have on its target variables.

As to the hierarchy of the different policy constraints, Frey and Schneider (1981) argue that the political constraint dominates the constraints set by both the exchange rate system and the economy. There are, however, arguments to qualify this assumption. With regard to the economic constraint, it seems sensible to argue that the government will accept that there are limits to what the bank can do, i.e., that there are market forces exogenous to monetary policy. This is in line with the empirical literature that finds that, for instance, the US interest rates have a strong influence on German interest rates.[8] The same is true (albeit for a different reason) for institutional restrictions. Since it is the German government itself that chooses the exchange rate system (see above) and default on such a commitment could be expensive, there may be good reason for believing that the government would not overrule the exchange rate constraint. We will return to this issue in the empirical part of the paper.

How did the Bundesbank conduct monetary policy? While the bank's task of pursuing its private ideology subject to the institutional and economic constraints described above can be reduced to a standard optimization problem, determining its political behavior may be more complicated. Frey and Schneider (1981) argue that, in the absence of other binding constraints, the central bank will follow a satisficing strategy which differentiates between two states of the world: a state of “no-conflict” and a state of “conflict” with the government. In a state of no-conflict (indicated by a dummy variable $C = 0$) the central bank is free to pursue its own ideology, i.e. conduct an anti-inflationary policy. However, in a state of conflict with the government ($C = 1$) the bank is assumed to adopt the policy stance taken by the fiscal authority. Note that, even though the dichotomous conflict indicator makes the model look like a rather crude approximation of reality, it easily lends itself to a less restrictive interpretation. For instance, assume that $C^* \in (0,1)$ is a continuous version of the conflict indicator, C, that characterizes the pressure the government applies to the central bank to adopt its policy stance. When the bank uses C^* to weigh the opposing policy targets when setting policy instruments, the previous model is simply a special case of its continuous variant.[9] Both hypotheses about the 'political' behavior of the central bank can be empirically tested. Section 3 now turns to the application of the model.

3. Defining Conflicts

Up to a point, the extension of a standard reaction function model to the conflict model proposed in section 2 is straightforward. The crucial element, however, is the definition of the conflict variable. As discussed, C is a dummy variable that is 1 if there is a conflict between the central government and the Bundesbank and 0 otherwise. We define a state of conflict as a situation where the general policy stances taken by the fiscal and monetary authorities are not compatible, that is, are not both contractionary or expansionary.

The direction of fiscal policy is measured as the change of the federal full employment budget balance in percent of GDP (*POLGOV*) (see the data appendix for details). An increase (decrease) in the balance indicates a contractionary (an expansionary) fiscal policy.[10]

The central bank's policy stance (*POLCB*) is measured by detrended annual first differences (annual growth rates) of the monetary aggregate M3.[11] Changes in M3 are a good indicator for the overall direction of monetary policy. Note, however, that, while the monetary policy can concurrently influence policy instruments like the day-to-day interest rate by deciding to change the conditions of its open market operations or its commercial bank credit facilities, notable changes in a stock variable like M3 occur only with a time lag. In our setting this an advantageous characteristic of the series because we can imagine the Bundesbank conflicting with the government and at the same time yielding to the government by changing its current policy variables.

Having defined both *POLCB* and *POLGOV*, we compute *C* as

$$C = \begin{cases} 0 \text{ if } POLGOV \cdot POLCB < 0 \\ 1 \text{ if } POLGOV \cdot POLCB > 0 \end{cases},$$

that is, a conflict occurs and $C = 1$, if the government's full employment budget balance increases (decreases) and M3 increases (decreases) as well.

Alternatively to this symmetric specification of *C* based on Frey and Schneider (1981), we can imagine restricting conflicts to scenarios where the Bundesbank ran a contractionary course and the government increased its budget deficit. Even though it is not entirely clear why the government’s reaction to monetary policy should be asymmetric, we will come back to this issue later.

With the transformation of *POLGOV* introduced above, we can calculate the dummy for monthly, quarterly, and annual data. Since we will later estimate the Bundesbank's reaction function with monthly data, increasing the frequency of *C* obviously has some benefits. On the other hand, data at higher frequencies contains more noise. Consequently, to be able to check the robustness of our results, we computed *C* for all three possible frequencies, i.e., monthly, quarterly, and annually.[12] In addition, we computed continuous versions of the different conflict indicators (C^*). The procedure weighs the realizations of the *C* variables over time.[13] While this is not the same as actually evaluating the “size” of a conflict – which would require rather daring judgements concerning the absolute and relative influence of *POLGOV* and *POLCB* on a conflict variable – it comes close to it. The continuous conflict indicator does ignore short sign-reverting blips in both series and will be the higher, the longer a policy conflict lasts.

Figure 1 introduces all conflict variables, where the permutations of the conflict indicators *C1*, *C2*, and *C3* (*C1**, *C2**, and *C3**) represent the original (the continuous) series derived from annual, quarterly, and monthly observations. In what follows, we will limit ourselves to report results for the intermediate continuous case (*C2**). In the majority of applications the outcomes are very robust across series'.[14]

(Figure 1 about here)

It is interesting to note that the indicators are broadly consistent with the qualitative evidence on historical conflicts between the Bundesbank and the German central government (Holtfrerich 1988, Berger 1997a, Berger and De Haan 1997). The bank's public (and sometimes also quite fierce) quarrels with chancellors Konrad Adenauer in 1955/56, Ludwig Erhard in 1965, and Helmut Schmidt in 1980/81, as well as the policy controversy after German unification are reflected in the conflict indicators. They are not, however, merely a reflection of the central government's re-election constraint. Regressions of the variables on a set of pre-election dummies show upcoming elections to have a mostly positive impact on (the probability of) conflicts, but the coefficients are far from significant.[15]

4. The Bundesbank's Policy Reaction Function with Conflicts

Frey and Schneider (1981) tested their conflict model of central bank behavior with quarterly data for the period 1957 to 1977 for the German Bundesbank. We will extend their estimates in three directions. First, we will apply the model to the whole post-war period 1951 to 1994, taking care of the particularities of the Bretton Woods period as well as German unification. Second, wherever possible, we will use monthly data that is more likely to capture the short term reactions of monetary policy. Third, we will increase the number of target variables considered to capture the "ideology" of the Bundesbank by an indicator for real economic activity.

Including the early 1950s is unproblematic, because the early Bundesbank, the *Bank deutscher Länder*, already closely resembled the later institution (Berger 1997a, 1997b). As to the turmoil of German (monetary) unification, it turns out that the introduction of simple dummy variable, *East*, 1 between 1990:06 and 1991:05 and 0 otherwise covers the particularities of the period quite well. For a set of Bundesbank policy instruments (*INSTR*) and conflict variables ζ, the model (ignoring the *East* dummy) is

(1) $$INSTR_t = \alpha + \sum_{j=1}^{p} \beta_j INSTR_{t-j} + \gamma(1-\zeta)\hat{\pi}_t + \eta(1-\zeta)\hat{y}_t + \lambda\zeta POLGOV_t + u_t\,,$$

$\hat{\pi}$ is cpi inflation and $\hat{y}$ is output growth (see the data appendix for details). The inclusion of the latter variable is standard in the recent literature (cf. Clarida and Gertler 1997). It might be interpreted as an – empirically well justified – inflation indicator. u_t is a random term that follows the usual assumptions. The economic variables and *POLGOV* will be instrumented by their own lagged values to take into account a two-period statistical lag. The AR-terms model the Bundesbank's smoothing of monetary policy. Woodford (1998) develops an argument why such inertia is optimal. Note that the AR-part is independent of ζ. The interpretation is that the government does share the bank's preference for interest rate smoothing.

For $\zeta = 0$, model (1) is reduced to a standard reaction function without a fiscal policy term. In the opposite case, when the Bundesbank faces a conflict with the government such that $\zeta = 1$, we expect it to follow the government's policy stance measured by *POLGOV*, the change in the fiscal surplus. For instance, the Bundesbank should decrease the day-to-day rate and aim at an expansionary policy when the government reduces its budget balance (increases its deficit). In this case, λ will be positive and significant. The interpretation for the continuous conflict variables, $0 \le \zeta \le 1$, is a straightforward extension of the discussion above. The cases $\zeta = 0, 1$ have already been covered. For a given intermediate level of government pressure, $0 < \zeta < 1$, we expect the central bank to take a more expansionary stance with a lower inflation or a decline in real economic activity, just as in the non-continuous case. Similarly, the model predicts a significant and positive coefficient for ζ *POLGOV*.

We apply equation (1) to four different policy variables: the day-to-day rate (*i*), the discount rate (*d*), the lombard rate (*l*), the rate the Bundesbank charges for lending in addition to allowed discount lending, and the minimum reserve requirements for large commercial banks (*mr*, in percent) (see data appendix). Figure 2 shows the time path of these instruments from 1951:01 to 1994:12. Obviously, the rates set directly by the Bundesbank, *d, l,* and *mr*, are less volatile than *i*. On the other hand, *i* moves broadly in line with the Bundesbank rates. As for *mr*, the Bundesbank seems to have made less active use of this instrument most of the time and it more or less stopped employing the minimum reserve as an active policy instrument in the early 1980s. We will restrict our analysis accordingly.

(Figure 2 about here)

The estimation period for all instruments except minimum reserve requirements starts in January 1951 and ends in December 1994, including 528 observations on monthly data. The sample considered in the case of *mr* ends in December 1981, including 372 observations on monthly data. All estimates are by TSLS.

(Table 1 about here)

Table 1 presents the results for ζ = *C2**. As already mentioned, our findings are quite robust both in quantitative and statistical terms over the different continuous and non-continuous variants of ζ. Especially, they do not depend on the transformation of the fiscal variables into quarterly values which allows us to exploit the higher frequency of the monetary and real data involved.[16] Across all instruments, the role of the AR-part remains both highly significant and strong. Columns 2 to 4 also show that, if $0 \leq \zeta < 1$, that is, in the absence of policy conflicts or for a sufficiently small level of government pressure, the Bundesbank reacted to higher (lower) real growth rates with contractionary (expansionary) changes of its instruments. For all instruments the estimated coefficients are positive and significant.[17] The Bundesbank also fought higher inflation by raising interest rates and reserve requirements, even though only the estimated coefficient for the day-to-day rate is significant at conventional levels. One interpretation is that, as already hinted, real growth might be an intermediate target for an anti-inflationary policy. This result is stable across various specifications and replicates very well the outcome of models that incorporate more or less complicated computations of forward-looking expectations for both variables (Clarida and Gertler 1997, Bernanke and Mihov 1997, Berger and Woitek 1997a).[18]

The fifth row in Table 1 reports the coefficients and significance levels of ζ *POLGOV*. Most coefficients are at least marginally significant and exhibit a positive influence on the RHS variables. That is, in times of conflicts with the government or for a given non-zero level of government pressure ($0 < \zeta \leq 1$), the Bundesbank adopted a monetary policy that was more in line with the direction taken by the government. Take the examples of the day-to-day-rate and the discount rate. In case of a full blown conflict, i.e. $\zeta = 1$, we would expect these variables to increase by 1.42 and 0.56 percentage points, respectively, when *POLGOV* increases by one standard deviation (or about half a percentage point[19]). Lower values of ζ will create smaller deviations from the bank's first best policy. In the absence of any policy conflict with the government ($\zeta = 0$) the Bundesbank pursued its own targets and raised the discount rate with the rate of output growth and inflation. When there was higher government pressure, however, the bank partly accommodated the government's policy stance.

As argued in Section 2, the assumption that the political constraint captured in the conflict variable always dominates both the economic and the institutional constraints may be too strong. Therefore, in a second extension of the original Frey/Schneider model, we include the US federal funds rate (i^{USA}) as a proxy variable for both the economic and the external influences the Bundesbank might have faced. The US short term interest rate is a good indicator of the forces prevailing on the world money market and it should also describe the policy line of the anchor country of the Bretton Woods system. i^{USA} is assumed to have influenced the Bundesbank's behavior independent of the occurrence of policy conflicts with the government. Therefore we expect interest rates as well as minimum reserve requirements to be positively correlated with the US rate. The following model is estimated:

$$(2) \qquad INSTR_t = \alpha + \sum_{j=1}^{p} \beta_j INSTR_{t-j} + \delta i_t^{USA} + \gamma(1-\zeta)\hat{\pi}_t + \eta(1-\zeta)\hat{y}_t + \lambda\zeta POLGOV_t + u_t \, .$$

Table 2 present the results setting, again, $\zeta = C2^*$.

(Table 2 about here)

The federal funds rate had the expected significant positive, albeit small, impact on the interest rate instruments. It is also highly significant. Only *mr* did not react to i^{USA} (column 5). In general, the results do not change fundamentally. Note, however, that the short term policy reaction explained by the non-endogenous variables increases (up to 11 percent) and that the impact of ζ *POLGOV* is larger than in Table 1. Also, with the exception of *mr*, all conflict terms are now significant at conventional levels.[20]

(Table 3 about here)

Table 3 puts the results further into perspective. We find, for instance, that for model (1) the change in the day-to-day rate provoked by a one standard deviation increase in *POLGOV* in case of a full conflict ($\zeta = 1$) is about 27 percent of the average level of the day-to-day-rate in the sample period. Alternatively, if we measure the impact against the interest rate level during the 1990-94 contractionary period, the figure is about 22 percent. The respective numbers for model (2) are larger, about 35 and 28 percent, respectively. The effects of policy conflicts on the Bundesbank's other instruments are somewhat lower, but still marked. We conclude that the Bundesbank's reaction to conflicts with the German government was all but negligible and that ignoring the notion that the government did not necessarily overrule the external constraints (or did force the Bundesbank to ignore basic market forces) introduces a negative bias into the estimated conflict variable.

5. Asymmetric Policy Conflicts: the "Too Conservative" Bundesbank

It can be argued that the symmetric conflict concept applied by Frey and Schneider (1981) is not a good description of reality – at least not a very intuitive one. What, if conflicts only occur in cases where the Bundesbank ran a contractionary course and the government revealed a preference for expansion? To investigate this notion, we define an asymmetric conflict variable, *CX*, such that

$$CX = \begin{cases} 1 & \text{if } POLGOV < 0 \text{ and } POLCB < 0 \\ 0 & \text{otherwise} \end{cases} .$$

Computing *CX*, we find that almost 6 out of 10 conflicts, as measured by the symmetric Frey/Schneider approach, drop out of the picture because they are based on central bank behavior that is "not conservative enough" by the standards of the government's fiscal stance. The intuitively more appealing case of policy inconsistencies caused by "too conservative central banking" captured in *CX* accounts for about 41% of all conflicts. The question is whether the Bundesbank behaved differently if we focus on these conflicts alone. Table 4 reports the results for the extended model (2) and the continuous version of *CX* (or $\zeta = CX2^*$ in the notation introduced in Section 2).

(Table 4 about here)

If anything, the outcome based on the asymmetric conflict definition builds an even stronger case for the model than the findings in the previous section: all conflict terms are larger and, with the exception of the minimum requirements, *mr*, which now border marginal significance, significant on conventional levels. Turning to the Bundesbank's policy in the absence of policy inconsistencies, we find that output growth and cpi inflation have a more pronounced effect on policy both in quantitative and statistical terms compared to Table 2. Obviously, the results presented in the last section do not stem from the fact that the definition of policy conflicts is a symmetric one.

6. External Constraints

There is another issue that warrants some discussion. As a matter of fact, simply introducing the US short term interest rate into the model to capture the external policy constraints of the Bundesbank ignores the effects the exchange rate regime has on the government. Berger (1997a) has argued that, during the "hard period" (Obstfeld 1993) of the Bretton Woods system in the 1960s, the exchange rate constraint often bound the executive as well. For instance, prior to the appreciation of the D-Mark in early 1961, high inflation rates and a Bundesbank rendered helpless by heavy capital inflows induced the government to implement contractionary measures while the bank continued to follow an expansionary path. Thus, even though the various ζ indices signaled a conflict during this episode, the Bundesbank had reason not to react. In a way, the fixed exchange rate system worked as an external commitment technology that further helped to insulate the Bundesbank from political pressure. If the example referred to above stands for a systematic effect, it might be worthwhile to check our previous results for their robustness. To that end, we re-estimate the Bundesbank reaction function with the model

$$\begin{aligned} INSTR_t = \alpha \quad & + \sum_{j=1}^{p} \beta_j INSTR_{t-j} \\ & + (1-BW)[\delta i_t^{USA} + \gamma(1-\zeta)\hat{\pi}_t + \eta(1-\zeta)\hat{y}_t + \lambda\zeta POLGOV_t] + \\ & + BW[\delta i_t^{USA} + \gamma(1-\zeta)\hat{\pi}_t + \eta(1-\zeta)\hat{y}_t + \lambda\zeta POLGOV_t] + u_t \;, \end{aligned} \tag{3}$$

where *BW* is a dummy variable that is 1 from January 1959, when the D-Mark first became fully convertible, to March 1973, when the Bretton Woods system was finally abandoned, and 0 otherwise.[21] Since the Bundesbank was the – unconstrained – anchor country of the various European exchange rate systems after 1973, we need not repeat this exercise for the post-Bretton Woods period. Table 5 present the results for the policy variables introduced above and the symmetric version of the conflict variable, $\zeta = C2^*$. We find similar results for the asymmetric case.[22]

(Table 5 about here)

As expected, the US interest rate is more important for German monetary policy within the Bretton Woods period.[23] But the most notable difference between both periods is that the coefficients for ζ *POLGOV* lose their statistical and quantitative weight within the "hard" Bretton Woods system. None of the estimates is significant. In contrast, the results outside the period of fixed exchange rates closely resemble the ones for the entire sample (see above). This indicates that the conflict hypothesis does fit the Bretton Woods period less well than periods with flexible exchange rate regimes. Obviously, the commitment to fix exchange rates prevents differences in policy to become policy conflicts. This is an important qualification of the findings reported above.[24] However, as the inclusion of the Bretton Woods period in the overall sample should bias the impact of ζ *POLGOV* downwards rather than upwards, the results reported previously appear to be even stronger.

7. The Bundesbank's Policy Reaction in a Simple Dynamic Context

It should be clear from the outcomes presented in the previous sections that the Bundesbank, even though its reputation for putting a lid on inflationary pressures is well deserved, did not operate in political vacuum. Measuring conflicts between the government and the central bank as opposing policy stances, we find that the Bundesbank at times yielded to the government.

However, it is also obvious that the bank's short term reaction was constrained by smoothing considerations. The question remains whether the Bundesbank reacted faster to economic or political variables. It would also be helpful to know the extent to which the impact of policy instruments on the bank's target variables had repercussions for the reaction function. A simple way to illustrate the dynamics of the bank's reaction are impulse response functions derived with the help of VAR model. We estimate the following model:

$$\text{(4)} \qquad \mathbf{x}_t = \sum_{j=1}^{12} \mathbf{A}_j \mathbf{x}_{t-j} + \mathbf{B}\mathbf{z}_t + \varepsilon_t \ .$$

The VAR models the relationship between each variable and the lagged variables of the system and the relationship between each variable and the other current variables. $\mathbf{x}_t$ is a (5 x 1) vector defined as $\mathbf{x}_t = (i_t^{USA},\ (1-\zeta)\hat{\pi}_t, (1-\zeta)\hat{y}_t, \zeta POLGOV_t,\ i_t)^{\mathrm{T}}$. We include 12 lags of each variable. $\mathbf{A}_j$ are the (5 x 5) - parameter matrices of the VAR-part. $\mathbf{z}_t = (1,\ East_t,\ rpi_t,\ e_t,\ BW_t\ i_t^{USA},\ BW_t\ e_t^{nom})^{\mathrm{T}}$ is a (6 x 1) - vector that contains variables assumed to concurrently influence $\mathbf{x}_t$ at period t according to the time invariant (5 x 6) - coefficient matrix $\mathbf{B}$. Following Berger and Woitek (1997a), we include in $\mathbf{z}_t$ a constant, a dummy variable *East* for monetary unification, the growth rates of the German commodity price index (*rpi*), the trade weighted real exchange rate of the DM against 18 industrial nations (foreign currencies per D-Mark, *e*), and the federal funds rate as well as nominal trade weighted exchange rate of the DM multiplied by a time dummy for the "hard period" of the Bretton Woods system ($BW\, i^{USA}$ and $BW\, e^{nom}$) (see the data appendix for details). The latter variables are supposed to capture the particularities of the fixed exchange rate system in this model. i^{USA} is an indicator for the monetary policy conducted by the dominant central bank in the fixed exchange rate system, that of the US. We expect the funds rate to have a contemporaneous and positive effect on the day-to-day rate during the "hard period" of the system. As nominal appreciation of the D-Mark, for instance in 1961, 1969, and 1971, gave the Bundesbank some leeway to raise its own interest rate, we anticipate

e^{nom} to have a positive impact on the short term interest rate as well. ε_t is a vector of disturbances following the usual assumptions.

The contemporaneous results of the model are as expected.[25] To illustrate its dynamic properties, we computed the impulse response functions for the day-to-day rate i_t, assuming the order i_t^{USA}, $(1-\zeta)\hat{\pi}_t$, $(1-\zeta)\hat{y}_t$, $\zeta POLGOV_t$, i_t. Figure 3 presents the results.

(Figure 3 about here)

As could be guessed from the single-equation results in the previous section, the Bundesbank's reaction to an unexpected rise in inflation during times without conflicts were positive but far from significant (middle figure). There is only a mild increase in the day-to-day rate with a maximum about 6 months after the shock, even though our VAR model incorporates a much more extensive lag structure than the models employed above. The reaction to positive shocks from the real side of the economy was much stronger and at least borders significance (top figure). The positive reaction sets in after about a month, climbs steadily (reflecting the adjustment costs discussed above) and reaches a maximum after about 12 months. Since prices tend to increase as the real economy heats up, this result should be interpreted as the Bundesbank acting to prevent imminent inflationary pressure.

Interestingly, the Bundesbank's dynamic reaction to sudden contractionary increases in the central government's budget balance in times of conflict (bottom figure) was different from its reaction to economic shocks. On the one hand, the overall impact of a policy conflict seems to be stronger both in statistical and quantitative terms. On the other, the Bundesbank was much slower in responding to political shocks. It is not before 6 months after the occurrence of a shock in $\zeta\, POLGOV$ that the central bank began to accommodate the fiscal policy stance. And the reaction reached its maximum after about 24 months, when the equivalent response to real economic shocks had already well faded out. From this we conclude that the Bundesbank, even though it reacted to political pressures, did so with a certain reluctance. A possible interpretation of this result is that the option value of waiting before adjusting to an indication of a policy conflict is larger than with economic variables. Adjustment costs could be higher either because the conflict variable is more volatile than economic targets or, not unlikely, because there are additional political costs – such as loss of reputation or loss of support from the financial sector – the Bundesbank faced when giving in to the government. In other words, it took a permanent and notable change in the Bundesbank's political constraint to make it yield in a policy conflict. This is a plausible reading of the evidence, as we hardly expect the central bank to react to every small blip in the time path of fiscal policy.

8. Conclusion

The Euro, Europe's new currency, is controlled by a central bank that has largely been modeled on the German Bundesbank. However, while the Bundesbank is well known for its inflation-averse monetary policy, there is still much to be learned about its actual relationship with the German government. Arguably, it had reason to yield to the government at times, because the government's legislative majority could have robbed the bank of its independence. This can hardly happen to the ECB, whose status is based on the unanimous consent of the members of the monetary union. If, however, the Bundesbank was less immune to political pressure than is commonly thought and, therefore, the ECB is more independent than its role model, the architects of EMU might well get more than they have bargained for. If this view is correct, the early years of the new institution could be marked by potentially harmful political turbulence, as some EMU members might refuse to accept the rule of a central bank that is "too independent" and conservative.

Following methods established by Frey and Schneider (1981), we show that the Bundesbank was indeed not totally independent of political pressure. At the core of our empirical investigation is a measure of policy conflicts based on revealed preferences of both actors, that is on actual fiscal and monetary policy. While this is not the only possible conflict indicator, it is a plausible one. The estimated model assumes that the Bundesbank more or less followed its own anti-inflationary agenda in normal times but mitigated its policy stance when the government increases its pressure in times of conflict. As should be expected, in the period January 1951 to December 1994 when there was a state of no-conflict or low government pressure, the Bundesbank reacted to higher (lower) real growth rates and inflation with contractionary (expansionary) changes in its instruments. However, when there was a conflict between the Bundesbank and the government (or high government pressure), the Bundesbank at least partially accommodated the opposing policy stance. This is true for all its instruments (with some exceptions for minimum reserve requirements), a range of variants of the conflict indicator, and alternative specifications of the underlying reaction function for monetary policy (that, e.g., control for the particularities of the Bretton Woods period). There is some evidence that the Bundesbank did not respond to every small indication of conflict with fiscal policy and that it took a permanent and serious change in the Bundesbank's political constraint to make it yield in a policy conflict. Overall, however, we have reason to conclude that the German central bank compromised during conflicts with the government more often than not. In other words, the Bundesbank did not operate in a political vacuum.

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Endnotes

1 There is evidence for a political business cycle in German monetary aggregates (Alesina, Cohen, and Roubini 1992). However, Berger and Woitek (1997b) show that this is due to electoral uncertainty rather than central bank intervention. See Lohmann (1997), Vaubel (1997), Berger and Woitek (1997c) on the related question whether the Bundesbank Council is lead by party preferences around elections. A critical view on the relation of central bank independence and monetary policy can be found in Posen (1993) and Solveen (1998).

2 The German *Länder* only have a suspensive veto on changes of the Bundesbank Law. See Berger (1997b). Even if the veto were decisive, however, one could probably argue that a move against the Bundesbank would be easier in the German case. The reason is that the ECB is (yet) not faced with the power of a strong federal government that has the means to coordinate or enforce such a move.

3 On the theory also see Schneider (1979). For official central bank targets see, among others, Borins (1972), Duwendag (1973), Parkin and Bade (1978), Cukierman (1992), Eijffinger and De Haan (1996). The evidence from reaction function studies is mixed, but on the whole indicates that price stability has been the main goal of central bank policy in most countries and for most periods. Reuber (1964) for Canada and Wood (1967), Christian (1968) and Froyen (1974) for the USA, found that in the early post-war years central banks used their policy instruments to combat inflation (cf. Dewald and Johnson 1963). See Taylor (1993) for recent US and international evidence pointing into the same direction. Basler (1978) has found that, for Germany, price stability was the central bank’s most important goal from 1958 to 1974. The recent VAR-based literature on German monetary policy has come to similar conclusions. See Clarida and Gertler (1997), Bernanke and Mihov (1997), Berger and Woitek (1997b), and Weber (1996). Despite the Bundesbank's

rhetorical commitment to a Friedman-type policy rule, most of these studies show that its behavior is best described as following an interest rate policy rule that sets the short-term interest rate to minimize deviations from rational expectations equilibrium values of inflation and real growth.

4 On the relation between central banks and the financial sector also see Posen (1993) and Cukierman (1992). For a critique of their quantitative results compare Eijffinger and De Haan (1996).

5 For evidence on such behavior in the case of the FED see e.g. Weintraub (1978) and Havrilesky (1995).

6 This is true even when the central bank is constitutionally independent. See, for instance, Borins (1972) and Duwendag (1973). See Eijffinger and De Haan (1996) for the terminology.

7 As the anchor country of the post-1973 European exchange rate system, the Bundesbank was never really constrained by currency markets after the end of Bretton Woods. See Kenen (1995).

8 This influence varies with the prevailing exchange rate system. See, among others, Berger and Woitek (1997a).

9 Tabellini's (1988) concept of a "degree of fiscal dominance" bears some resemblance with this interpretation. See Fratianni and Hagen (1993).

10 Budget figures are available on an annual basis only ($POLGOV_j$). To be able to use monthly data on monetary and economic variables when desirable, we transformed the series into monthly data ($POLGOV_t$) by minimizing the expression

$$\min_{\{\text{POLGOV}_t\}} \sum_{t=1}^{T} (\Delta\text{POLGOV}_t - \Delta\text{POLGOV}_{t-1})^2 \; s.t. \; \text{POLGOV}_j = \sum_{t=1}^{12} \text{POLGOV}_{t,j} \quad ,$$

where $\Delta POLGOV_t$ is the first difference of the computed monthly series and j = 1951,..., 1994. The procedure can be interpreted as an extension of the Hodrick-Prescott filter that takes into account the fact that the computed monthly budget flows sum up to the observed annual flows.

[11] The series has also been corrected for the effects of German unification. See the data appendix.

[12] The quarterly and annual series' were constructed setting C equal to its quarterly or annual value in each month of the respective quarter or year.

[13] Each continuous series is the output of a Hodrick-Prescott filter applied to the C variable with the corresponding frequency. The smoothing parameter was set to 14400. See Hodrick and Prescott (1980).

[14] This is true for both the different frequencies and the continuous/non-continuous variants of the series'. We will comment on some alternative results as we go along. The complete results are available from the authors.

[15] In addition to the pre-election dummies active 18, 12, and 6 months before federal elections, regressions included lagged endogenous variables and a constant. One model was estimated for every pre-election dummy. Estimation for C by Probit, for C^* by OLS. Results available on request.

[16] All alternative results are available on request.

[17] For l and mr the significance of the estimates seems to be higher for the continuous conflict variables and to increase with the frequency of ζ (results not reported).

[18] While the overall results barely change, expected inflation tends to have a somewhat stronger influence on the day-to-day rate than actual inflation in the simple model used above. The opposite is true for expected and actual output growth. See, among others, Clarida and Gertler (1997). This observation reinforces the idea that actual output growth served as an indicator of inflationary pressure for the Bundesbank.

[19] The standard deviation of *POLGOV* 1951 to 1994 is 0.49 (annual basis). Min./aver./max. are 0.01/0.58/2.01, respectively.

[20] Again, the quantitative results for *POLGOV* in model (2) are very robust across most permutations of the conflict indicator. In case of *mr* the significance level of *POLGOV* increases to conventional levels as we switch to non-continuous versions of ζ.

[21] Alternatively, we considered a *BW* dummy that ends in May 1971, when the Deutschmark was first left floating. The results are comparable.

[22] Results for *CX2** available on request.

[23] The estimated impact of output growth within Bretton Woods is considerably lower, if we allow the AR-part to vary with the exchange rate regime too (all other results remain comparable to the outcome presented in Table 5). That there actually is *some* correlation between German output and monetary policy has to do with the similarities in the German and the US business cycle. As a rule, the Bundesbank did not have the leeway to consciously follow its own policy goals in this period (Obstfeld 1993).

[24] As already pointed out by Berger (1997a), this also qualifies the results of Frey and Schneider (1981) for the period 1957-77.

[25] Available on request. We use the continuous version of ζ based on monthly observations (*C3**) and the corresponding monthly version of *POLGOV* in the VAR.

Appendix: Data

Unless mentioned otherwise, all series are monthly and stationary according to standard unit roots tests (not reported). When no other source is mentioned, the source is the Bundesbank	
i	German daily interest rate in percent. 51:1 to 53:12 approximated by the central bank's discount rate. In percent
d	Bundesbank discount rate, charged for lending through the discount window in percent
l	Bundesbank lombard rate, charged for lending above the discount window in percent
mr	Minimum reserve requirement for the largest commercial banks in percent
East	*East*-dummy, 1 after the German monetary union 90:06 to 91:05 and 0 otherwise
C	*Conflict*-dummy, 1 during a conflict between monetary and fiscal policy. A conflict arises, when monetary policy is contractionary (expansionary) but fiscal policy is expansionary (contractionary). See text for details
BW	*Bretton-Woods*-dummy, 1 during the "hard period" of the Bretton-Woods system 59:1 (when the D-Mark became fully convertible) to 72:12 and 0 otherwise
i^{usa}	Federal fund rate. Source: FED, NY
$\hat{\pi}$	Annual first differences of the cpi index in logs. Berger and Woitek (1997a) show that transforming the series into annual growth rates is the appropriate method to deal with seasonal integration
$\hat{y}$	Annual first differences of the net production index (in logs, detrended with a linear trend). See the note on seasonal integration above
POLCB	Annual first differences of M3 in logs. The series has been detrended using a linear trend and a dummy variable *East* (see above) that corrected for the effects of monetary unification, i.e., the introduction of the D-Mark in Eastern Germany in the summer of 1990. Data for the 1950s from Berger and Woitek (1997a).
POLGOV	Change in the federal full employment budget balance against the previous year in percent of current GDP. An increase (decrease) in the balance indicates a more contractionary (expansionary) fiscal policy stance. See text for details. The full employment budget has been computed with the help of capacity utilization figures obtained from Berger (1997b) and Sachverständigenrat (1994, 1996)
rpi	Annual first differences of the German commodity and raw material price index in logs
e^{nom}	Annual first differences of the index of the nominal trade weighted exchange rate of the DM (foreign currencies per D-Mark) against 18 industrial countries in logs
e	e^{nom} in real terms

Figure 1: Conflict Variables

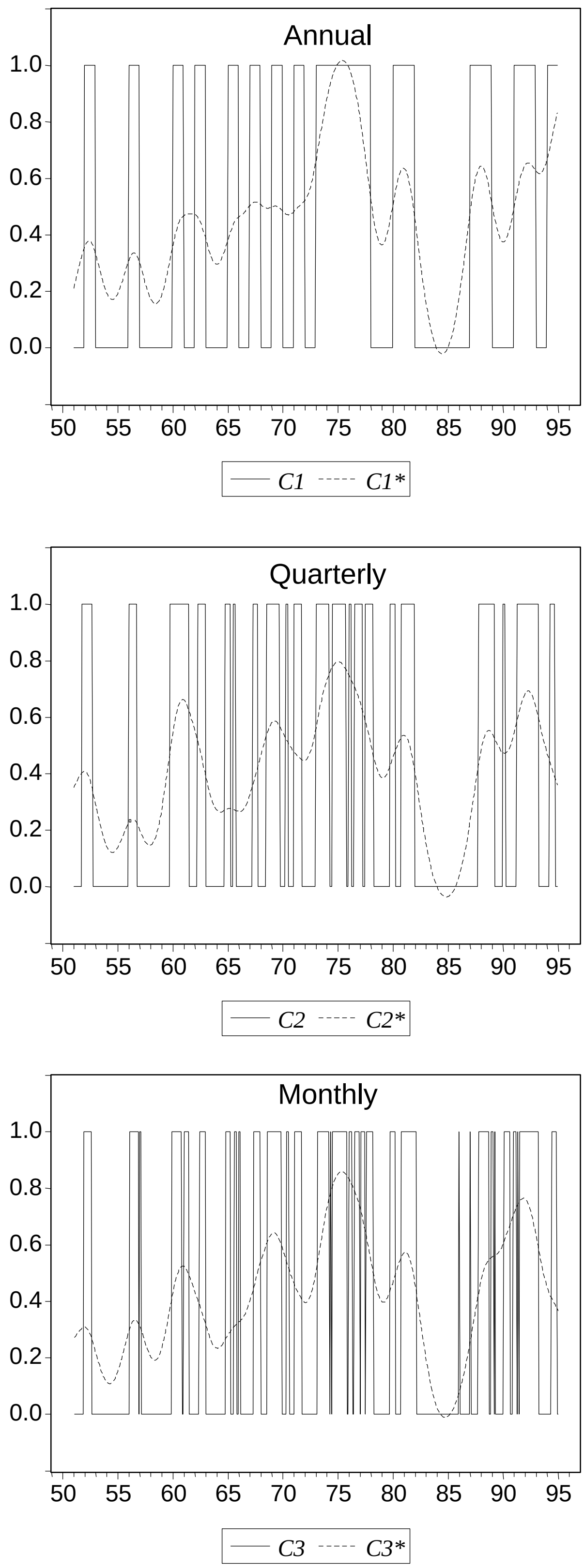

Figure 2: Policy Instruments

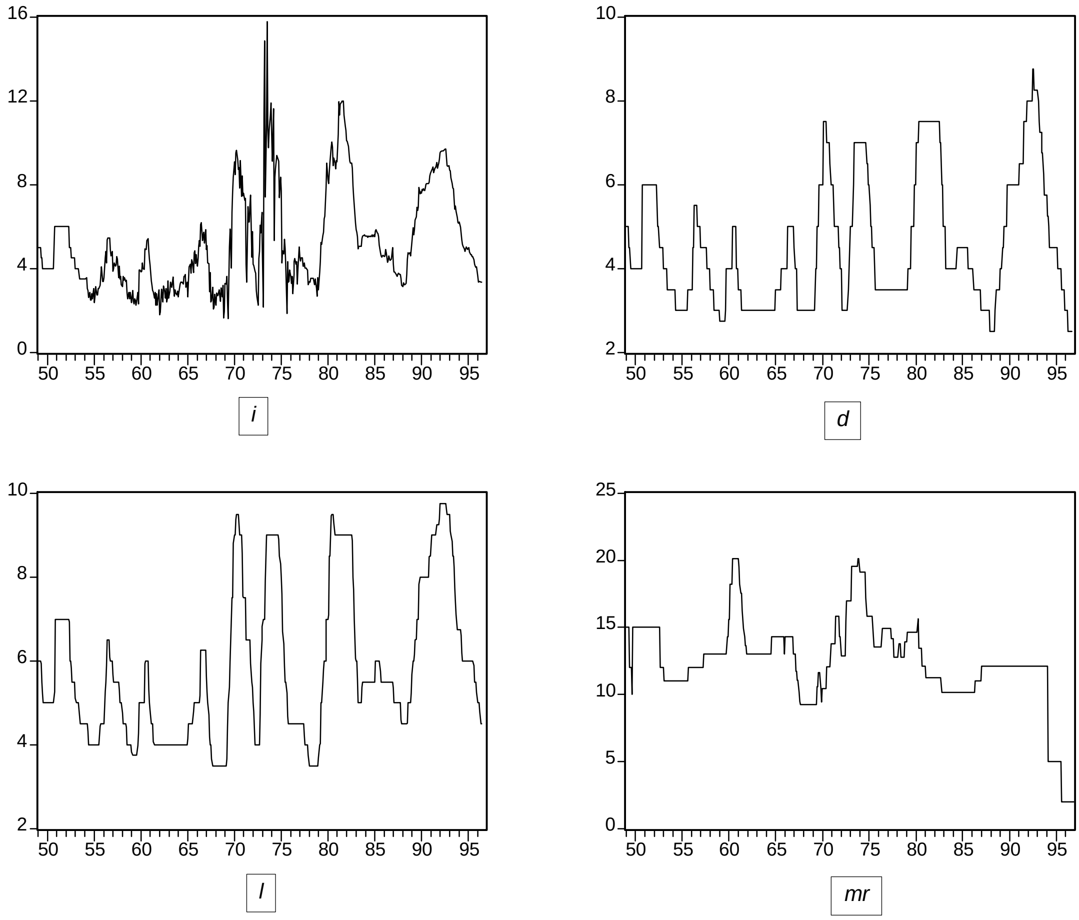

Figure 3: Dynamic Reaction

Response of the day-to-day rate to one S.D. Innovations ± 2 S.E

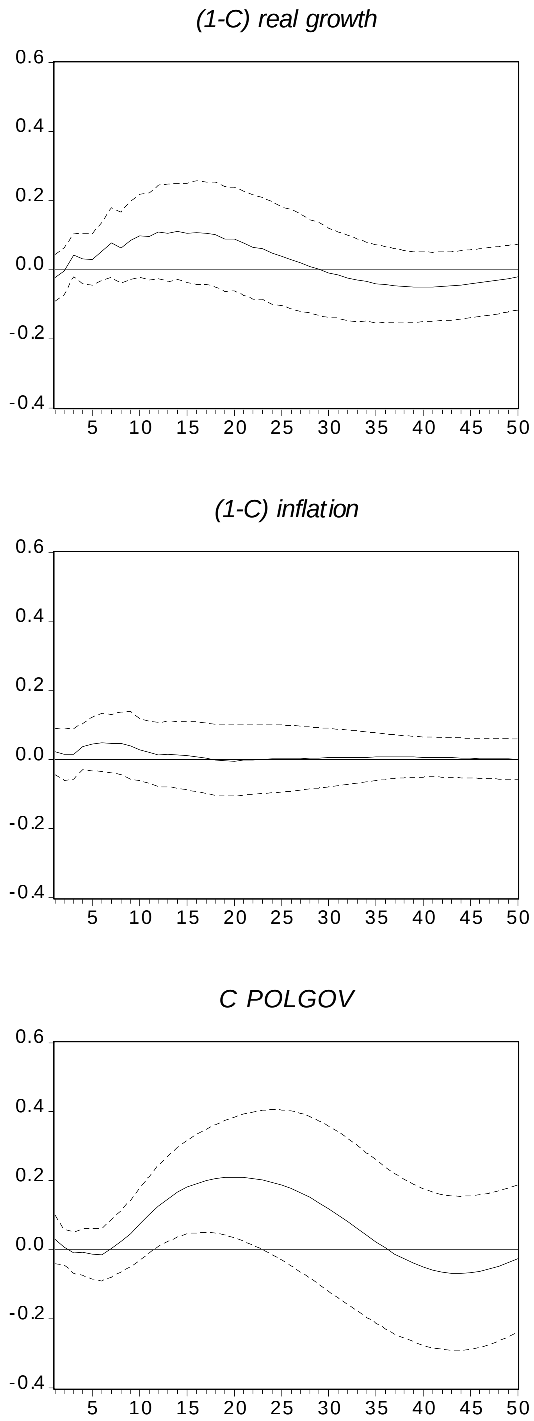

Table 1: Basic reaction function with conflicts

INSTR	*i*	*d*	*l*	*mr*[a]
a	0.18**	0.06*	0.09***	0.27*
	(2.38)	(1.83)	(3.09)	(1.73)
$\sum_{j=1}^{p}\beta_j$	0.93***	0.96***	0.98***	0.98***
$(1\text{-}\zeta)\ \hat{\pi}$	7.61**	1.67[b]	1.69*	5.29*
	(2.07)	(1.41)	(1.74)	(1.87)
$(1\text{-}\zeta)\ \hat{y}$	6.97***	2.92***	2.11***	4.38**
	(3.39)	(3.99)	(4.00)	(2.45)
ζ *POLGOV*	2.82*	1.12***	0.72*	0.97
	(1.85)	(2.63)	(1.93)	(0.72)
R^2_{adj}	0.88	0.97	0.98	0.95
SSR	375.24	37.57	28.32	100.71
F-stat	425.82	2417.08	4003.30	1594.15

a: 1951:01 to 1981:12. *b:* significant at the 16 percent level

Notes: */**/*** indicate significance at the 10/5/1 percent level. Numbers in brackets below coefficients are absolute *t*-statistics. Estimates by TSLS

- $\ddot{\pi}$, $\ddot{y}$, and *POLGOV* are instrumented with their lagged values (lags: 3, 4, 5, and 6) taking into account a statistical lag of 2 periods.
- *POLGOV* is chosen to match the frequency of ζ = *C2**. In every month of a given quarter *POLGOV* is set to 1/3 of its quarterly value.
- All regressions include a dummy *East* that is active in the year after German monetary unification (see data appendix). In most cases *East* is significant at conventional levels and positive (not reported).
- *p* is set to *i*: 5, *d*: 3, *l*: 4, and *mr*:2 using standard methods (sequential *t*-tests). A Wald-test on the joint significance of the AR-terms is significant at the 1 percent level in all cases.
- All standard errors are estimated using the suggestions of Newey and West (1987) for a HAC covariance and variance matrix.

Table 2: Extended reaction function with conflicts

INSTR	*i*	*d*	*l*	*mr*[a]
a	0.13*	0.04[b]	0.08***	0.28*
	(1.72)	(1.41)	(2.71)	(1.81)
$\sum_{j=1}^{p}\beta_j$	0.89***	0.96***	0.97***	0.97***
i^{USA}	0.04***	0.01***	0.01***	-0.00
	(3.68)	(3.13)	(3.35)	(0.55)
$(1\text{-}\zeta)\ \hat{\pi}$	6.06*	1.10	1.12	5.53*
	(1.74)	(0.95)	(1.11)	(1.87)
$(1\text{-}\zeta)\ \hat{y}$	6.79***	2.97***	2.25***	4.34**
	(3.45)	(4.01)	(4.26)	(2.42)
ζ *POLGOV*	3.65**	1.29***	0.90**	0.98
	(2.36)	(2.72)	(2.18)	(0.73)
R^2_{adj}	0.88	0.97	0.98	0.95
SSR	364.27	37.08	27.91	100.63
F-stat	396.03	2140.67	3605.08	1325.83

a: 1951:01 to 1981:12.

Notes: See Table 1.

Table 3: The impact of conflicts on the Bundesbank's policy variables

		i	*d*	*l*	*mr*
Sample	Model (1):	26.81	12.36	6.19	3.56
period [a]	Model (2):	34.70	14.24	7.73	3.60
Last	Model (1):	21.53	6.80	3.30	3.28
contraction [b]	Model (2):	27.86	7.84	4.12	3.32

Notes: Impact of a one s.d. increase in *POLGOV* on the respective policy instrument in percent of instruments average across the period (all instruments are measured in percent – see the data appendix). The table assumes a full blown policy conflict (ζ=1) and, thus, reports the maximum impact of the fiscal variable on monetary policy. The impact does not change too much if averaged across all iterations of the conflict variable discussed in Section 3.

[a] 1951:01 to 1994:12 for all instruments but *mr* (1951:01 to 1981:12)

[b] 1990: 01 to 1994:12 for all instruments but *mr* (1971:01 to 1981:12)

Table 4: Extended reaction function with asymmetric conflicts

INSTR	*i*	*d*	*l*	mr^a
a	0.08	0.02	0.06*	0.32*
	(1.09)	(0.84)	(1.90)	(1.82)
$\sum_{j=1}^{p}\beta_j$	0.88***	0.96***	0.97***	0.97***
i^{USA}	0.04***	0.01***	0.01***	-0.00
	(3.45)	(2.74)	(2.98)	(0.55)
$(1-\zeta)\ \hat{\pi}$	6.91**	1.39*	1.55**	4.40**
	(2.14)	(1.82)	(2.23)	(2.03)
$(1-\zeta)\ \hat{y}$	5.69***	2.54***	2.22***	2.72*
	(3.83)	(4.60)	(4.58)	(1.93)
ζ *POLGOV*	5.03**	1.57**	1.23**	2.84^b
	(2.01)	(2.06)	(2.12)	(1.40)
R^2_{adj}	0.88	0.97	0.98	0.95
SSR	365.50	37.38	28.42	99.08
F-stat	395.04	2123.39	3542.15	1347.03

a: 1951:01 to 1981:12. *b:* Significant at the 16 percent level.

Notes: ζ = *CX2**. See the text and Table 1.

Table 5: Impact of Bretton Woods

INSTR	*i*	*d*	*l*	mr^a
a	0.08	0.02	0.06*	0.25^c
	(0.88)	(0.59)	(1.67)	(1.36)
$\sum_{j=1}^{p}\beta_j$	0.88***	0.96***	0.96***	0.98***
		Non Bretton Woods period (1- BW)		
i^{USA}	0.05***	0.01***	0.01***	-0.00
	(3.87)	(3.31)	(3.46)	(0.25)
$(1-\zeta)\ \hat{\pi}$	7.79^b	1.41	0.87	3.71^d
	(1.42)	(1.27)	(0.70)	(1.46)
$(1-\zeta)\ \hat{y}$	5.71**	2.62***	1.48*	3.36^b
	(2.34)	(2.65)	(1.84)	(1.42)
ζ *POLGOV*	4.13***	1.42***	1.17**	0.66
	(2.64)	(2.83)	(2.50)	(0.57)
		Bretton Woods period (BW)		
i^{USA}	0.07**	0.03***	0.02**	-0.04
	(1.98)	(2.73)	(2.04)	(0.62)
$(1-\zeta)\ \hat{\pi}$	9.22	0.15	2.05	14.05**
	(1.13)	(0.05)	(0.86)	(2.51)
$(1-\zeta)\ \hat{y}$	9.52***	2.93***	3.40***	6.62***
	(4.22)	(3.16)	(3.50)	(3.18)
ζ *POLGOV*	2.29	0.80	0.24	4.33
	(0.50)	(0.65)	(0.21)	(0.91)
R^2_{adj}	0.88	0.97	0.98	0.95
SSR	362.81	33.30	27.46	99.92
F-stat	282.04	1446.35	2515.55	792.78

a: 1951:01 to 1981:12.
b: significant at the 16 percent level
c: significant at the 18 percent level
d: significant at the 15 percent level
Notes: See Table 1.